



Great Lakes Science Center

PCBs and Mercury in the Great Lakes — Effects on Health of Lake Trout

Lake trout (*Salvelinus namaycush*) historically was the top native predator fish in the Great Lakes and an important component of commercial and sport fisheries. A combination of over-fishing and predation by the exotic sea lamprey (*Petromyzon marinus*), along with other contributing factors caused the extirpation of lake trout during the 1950s in all of the Great Lakes except Lake Superior, where populations were greatly diminished.

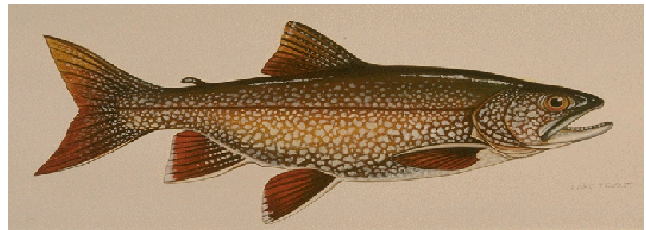
For over 40 years the Great Lakes Science Center (GLSC), now a research center of the U.S. Geological Survey, has worked closely with the Great Lakes Fishery Commission and its cooperating U.S. and Canadian Federal agencies, the eight Great Lakes states, the Province of Ontario, and Tribal fishery management agencies to restore lake trout populations in all of the Great Lakes.

One technique that GLSC researchers currently use to investigate lake trout's failure to be re-established involves studying the effects of contamination on a trout's immune system. Our researchers chose to study the Saginaw Bay area of Lake Huron because of its unique characteristics. Many factories line the bay and rivers in the watershed in this highly industrialized and fairly contaminated area. However, fisheries still exist as a source of income for the community. Therefore, Saginaw Bay was a good site to study the effects, to fish and otherwise, of major contaminants in the Great Lakes.



Researchers at the GLSC analyzed PCB and mercury levels in two parts of Lake Huron: one in Saginaw Bay and the other in the middle of Lake Huron at Six-Fathom Bank, almost to the Canadian side. These two areas give us contrasting sites in which to compare trout from a refuge area (in the middle of the lake) with lake trout in a more contaminated near shore area.

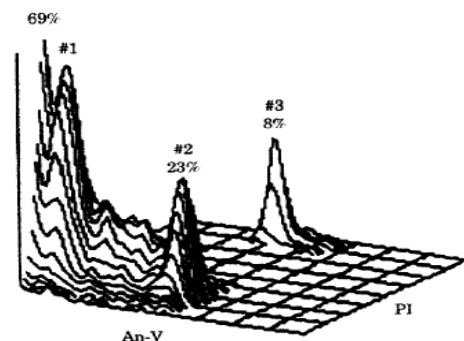
Biologists picking lake trout from gill net on research vessel



After these fish are caught, our researchers analyzed the liver, spleen and remaining whole carcass of each fish to test for contaminants. By doing this, our scientists may more accurately understand how and where contaminants affect lake trout the most.

Then, in the laboratory scientists test lake trout's thymi (immune tissue glands) to show the activity and amount of programmed cell death (apoptosis) and necrotic cell death of T cells when exposed to the same concentrations of PCBs and mercury found in the lake.

Hopefully, this research will give us insight into factors contributing to the apparent failure of lake trout reproduction after several decades of stocking practices. With further research, and the help of our partners, the GLSC hopes to play an integral role in the restoration of the lake trout.



Cytogram of untreated lake trout thymocytes indicating observed range of cell death (69% viable, 23% apoptotic, 8% necrotic)